SEAS (Sustainable Environment Agricultural Science) E-ISSN 2614 – 0934
https://ejournal.warmadewa.ac.id/index.php/seas
Vol. 3, Number 1, April 2019, pages: 7 - 12 http://dx.doi.org/10.22225/seas.3.1.1331.7-12

Published: April 30th, 2019

Microbiological Test of Siomai Product

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Abstract

This study aims to analyze the contaminants of E. coli bacteria, Salmonella sp and the Total Plate Count found in siomai food. This study uses treatment, namely siomai traders and sampling time. The data obtained were analyzed for variance and if there was a real or very real effect between the different treatments then continued with the Least Significant Difference (LSD) test of 5% and 1%. The results of this study indicate that of the 12 samples, there were 11 samples of siomai not contaminated with E. coli bacteria, and from the whole siomai samples found no contamination of Salmonella sp. Total Plate Count results on afternoon sampling at trader 6 that is 1.8 x 107 colonies / gram which is not significantly different from other treatments based on SNI 7756: 2013 concerning the quality and safety requirements of siomai namely Total Plate Count 5 x 104 colonies / gram. A total of 4.17% of the samples did not meet the standards of maximum bacterial contamination that had been determined.

Keywords: E. coli; Salmonella sp; Siomai; Total Plate Count (TPC)

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1. Introduction

Food, as outlined in Law of RI No. 18 of 2012, is everything that comes from biological sources of agricultural products, plantations, forestry, fisheries, livestock, and water, whether processed or not processed which is intended as food or drink for human consumption, including food additives, ingredients food standards, and other materials used in the preparation processing, and/or manufacturing of food or beverages (1).

The risk of transmission of microorganisms can occur if the processing of food that is not clean. This is initial point of the presence of microbes in food. Bacteria in food or drinks caused by the sale of food that does not pay attention to cleanliness and safety (2). Based on Law of RI No. 18 of 2012, food safety is the conditions and efforts needed to prevent food from possible biological, chemical and other contaminants that can interfere with, harm and endanger human health and do not conflict with the religion, beliefs and culture of the community so that it is safe for consumption (1).

Particularly, Siomai is a type of dim sum. Dim sum is a typical food from China which means steamed snacks, dim sum is usually served with chili sauce for added flavor. Dim sum snacks that have a high nutritional value are usually filled with meat, chicken, fish, shrimp, fruits, and vegetables. In China, siomai are food from minced pork wrapped by skin from wheat flour which is then steamed. The popularity of dim sum in Indonesia is quite extensive, highly sought after and favored by the people of Indonesia (3).

2. Material and method

Time and Location of the Research

The location of this research was carried out at the Denpasar Veterinary Center Laboratory. This research was conducted on Februsary until August 2018.

Materials and Instruments of the Research

The materials used in this study are siomai, PCA media (Plate Count Agar), BPW (Buffered Pepton Water 0.1%), BGLBB (Brilliant Green Lactose Bile Broth), LSTB (Lauryl Sulfate Tryptose Broth), ECB (Escherichia Coli Broth), LEMBA (Levine Eosin Methylene Blue Agar), MR-VP (Methyl Red-Voges Proskauer), KCB (Koser Citrate Broth), SCA (Simmons Citrate Agar), LB (Lactose Broth), TTB (Tetra Thionate Broth), RV (Rappaport Vassiliadis), XLDA (Xylose Lysine Deoxycholate Agar), HEA (Hektoen Enteric Agar), TSIA (Triple Sugar Iron Agar), BSA (Bismuth Sulfite Agar), LIA (Lysine Iron Agar), BHI (Brain Heart Infusion), LDB (Lysine Decarboxylase Broth), KCNB (Potassium Cyanide Broth), SCB (Selenite Cystine Broth), TSTB (Trypticase Soy-Tryptose Broth), TB (Tryptose Broth), urea broth, malonate broth, phenol red sucrose broth, phenol red sucrose broth) broth, keratin crystals, covas reagents, voges-proskauer reagents, and bromcresol purple dye solution 0.2%.

The instruments used in this research are Borax Rapid Test Kit, Durham tube, Petri dish, test tubes, pipette size 1 mL, 2 mL, 5 mL, 10 mL, media bottle, scissor, tweezers, inoculation cursor, stomacher, Bunsen burner, pH meter, scale, magnetic stirrer, vortex, incubator, water bath, autoclave, clean bench, refrigerator, freezer, volumetric pipette, colony counter.

Design of the Research

This research is a factorial experiment with a randomized block design (RBD) consisting of two factors. The first factor is traders (P) and the second factor is sampling time (S).

The first factor consists of 6 traders, namely P1 (Siomai Trader 1), P2 (Siomai Trader 2), P3 (Siomai Trader 3), P4 (Siomai Trader 4), P5 (Siomai Trader 5), P6 (Siomai Trader 6). Meanwhile, the second factor is the time of sampling, namely S1 (09.00 WITA) and S2 (14.00 WITA). The sampling process was carried out on May 21, 2018 and June 26, 2018. Each treatment was repeated 2 times to obtain 12 experimental units. Then, the data obtained were analyzed for variance and if there was a real or very real effect between the different treatments then continued with the Least Significant Difference (LSD) test of 5% and 1%

Implementation of the Research

The implementation of the research in sampling process of siomai from 6 traders, can be seen in Figure 1 the flowchart of research implementation.

Data Analysis

The data obtained from the objective test is processed by using analysis of variance (F test) to determine the safety quality of siomai of each treatment, if the results show a significantly different/very significant effect on the characteristics of the siomai, then proceed with the LSD test of 5%.

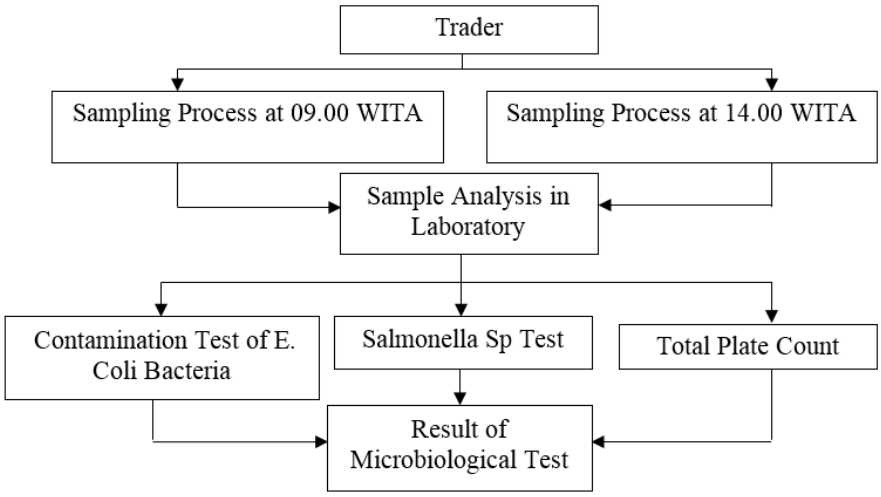

Figure 1.
Flowchart of Research Implementation

2. Results and Discussion

Escherichia coli

Based on the results of the study in Table 1 shows that from 12 samples, there were 11 of the samples found no Escherichia coli contamination (<3.6 MPN/gr) within siomai food. According to (4) E. coli bacteria grow at a temperature of 10o C- 40oC and can die on heating above 40oC in 60 minutes. The bacteria E. coli can be spread through water and contaminated materials in direct contact with the equipments that are used. In the food processing process, usually these bacteria will contaminate the tools and materials used in the food processing. If consumed by humans can cause diarrhea.

Table 1.
Results of *E. coli* Test on 12 Siomai Samples

No.	Sample	*E. coli* (<3.6 MPN / gr)			
		at 9:00 am		at 2:00 pm	
		I	II	I	II
1	Siomai 1	<3,6	<3,6	<3,6	<3,6
2	Siomai 2	<3,6	<3,6	<3,6	<3,6
3	Siomai 3	<3,6	<3,6	<3,6	<3,6
4	Siomai 4	<3,6	<3,6	<3,6	<3,6
5	Siomai 5	<3,6	<3,6	<3,6	<3,6
6	Siomai 6	<3,6	<3,6	<3,6	3,6

Based on the results of research on 12 samples of siomai in E. coli testing, there were 11 siomai samples showing values <3.6 MPN/gr and there was one sample that showed a value of 3.6 MPN/ gr. The Siomai sample show 3.6 MPN/gr is not safe for consumption. The trader 6 did not maintain the hygiene and sanitation of siomai food during repetition of daytime sampling so that it was contaminated by E. coli bacteria. According to (5) regarding the standard Most Probable Number (MPN), contamination of coliform bacteria which is <3.6 MPN/gr so that 1 sample of siomai is not safe for consumption. From the results of research conducted by (6) it has been reported that in the two types of siomai sauce found no E. coli bacteria. This is due to bacteria has died already during the heating process. In making siomai sauce, the sellers use clean water in order to not polluted by E. coli

bacteria. In the process of making siomai sauce the sellers pay attention to hygiene and sanitation so that the siomai has fulfilled the requirements of the Indonesian National Standard (SNI) 2897: 2008 regarding the standard Most Probable Number (MPN) of coliform contamination which is <3.6 MPN / gr.

Salmonella sp.

Based on the results of the study as in Table 2 of the 12 samples obtained that siomai who sold by six traders were negative from the presence of Salmonella sp. Siomai that has been examined are safe for consumption by all communities because there were no microbial Salmonella sp. contamination found. Based on the growth temperature of Salmonella sp. which is between 25oC -30oC with a minimum temperature of 15oC and a maximum of 45oC -55oC, Salmonella sp can die at a heating temperature of 70oC in 2 minutes. Based on (7) that siomai traders have fulfilled (8) standard, which is negative so that siomai snacks are safe for consumption.

Table 2.
Result of Salmonella sp. bacteria Test of 12 Siomai Samples

No.	Sample	*Salmonella sp.*			
		At 9:00 am		at 2:00 pm	
		I	II	I	II
1	Siomai 1	Negative	Negative	Negative	Negative
2	Siomai 2	Negative	Negative	Negative	Negative
3	Siomai 3	Negative	Negative	Negative	Negative
4	Siomai 4	Negative	Negative	Negative	Negative
5	Siomai 5	Negative	Negative	Negative	Negative
6	Siomai 6	Negative	Negative	Negative	Negative

The (9) have reported 10 samples of siomai snacks that were tested. From the results of his research obtained 7 siomai snacks that are contaminated by Salmonella sp. With the finding of Salmonella sp, it shows that the environment around the place of selling siomai is less hygienic. Based on observations it is known that the environment of the place of sale is close to fishmongers, chicken sellers and landfills. Foods that are sold are not covered and traders do not wash their hands before preparing food, so that it can cause contamination of Salmonella sp bacteria contamination in siomai food. Another thing that is known to cause bacterial contamination is the storage container for siomai and siomai bean seasoning in an open state when the siomai is being sold to customers. This is based on observations of siomai sellers alongside the road. Although selling alongside the road, the sellers keep maintaining the hygiene and sanitation on Siomai, thus the results obtained are negative from the contamination of Salmonella sp. The results of research on 6 samples of Siomai have met the Indonesian National Standard (SNI) 2897: 2008 which is negative from contamination of Salmonella sp bacteria so that siomai are safe for consumption. Based on the results of research conducted by (10), there were 5 samples of siomai food that were tested. As many as 3 samples tested were not contaminated by Salmonella sp this due to the siomai sellers maintain hygiene and sanitation so that the siomai are safe for consumption. Whereas 2 siomai samples were contaminated with Salmonella sp bacteria, it was caused by unclean storage containers, tools and materials used that were not hygiene and sanitation, and in the heating temperature used was less than 56oC, thus the 2 siomai samples were not suitable for consumed.

Total Plate Count

Based on Table 3 and analysis of variance statistics showed that siomai at different traders with sampling in the morning and afternoon showed significantly different results (P> 0.05) on the *Total Plate Count*. From the results of the *Total Plate Count* test showed only one treatment that did not meet the requirements, namely the traders siomai 6 with afternoon sampling is 1.8 x 10 ^{7} colonies/g, quality and safety requirements siomai maximum limit of *Total Plate Count* is 5 x 10 ^{4} colonies/g. So based on Table 3. it is seen that 4.17% does not meet the maximum limit standard of bacterial contamination that has been determined. The high value of the *Total Plate Count* is probably caused by several factors such as the source of food used that has been contaminated by bacteria, the place and also the equipment of processing are not guaranteed to be clean, the serving of food is not free from contamination, and sanitation of food vendors is lacking, moreover the level of education of sellers is still lack of knowledge

Table 3.
Results of Siomai Microorganism Test based on Total Plate Count (Colony/g) Value of 12 Siomai Samples

No.	Sample	*Total Plate Count* (Colony/g)			
		At 9:00 a.m.		Pukul 2:00 pm	
		I	II	I	II
1	Siomai 1	1.4 x 10 ^{4}	5.0 x 10 ^{2}	5.8 x 10 ^{2}	3.8 x 10 ^{2}
2	Siomai 2	1.9 x 10 ^{4}	3.1 x 10 ^{2}	9.4 x 10 ^{2}	1.7 x 10 ^{2}
3	Siomai 3	5,3 x 10 ^{2}	2.8 x 10 ^{3}	4.1 x 10 ^{2}	4.6 x 10 ^{2}
4	Siomai 4	2.3 x 10 ^{3}	2.2 x 10 ^{3}	1.0 x 10^{3}	3.8 x 10^{4}
5	Siomai 5	1.9 x 10 ^{3}	1.4 x 10 ^{3}	2.8 x 10 ^{2}	5.5 x 10 ^{2}
6	Siomai 6	2.5 x 10 ^{3}	4.7 x 10 ^{2}	2.9 x 10 ^{2}	1.8 x 10 ^{7}

about sanitation and hygiene in processing and serving food.

From the results of research conducted by (6) it is known that samples of siomai sauce were tested as many as 10 samples. A total of 3 samples of siomai sauce have met the requirements of the Total Plate Count, which is less than 30-300 colonies/gr so that the results obtained are suitable for consumption. While 7 samples of siomai sauce did not meet the requirements, namely the number of bacterial colonies was more than 300 colonies/gr. For samples of siomai sauce that do not meet these requirements, refer to the quality health standard based on (11)on the limit of microbial contamination in tomato sauce a maximum of 2 x 10 2 colonies/gr, thus 7 samples of siomai sauce are not suitable for consumption.

Based on the results of research conducted by (10), it is known that this study uses 5 samples of Siomai. In the study, 2 samples of siomai exceeded the maximum limit of microbial contamination determined by (12), namely 1 x 10 5 colonies/g. Samples with the highest total plate count were 2 x 10 6 colonies/g. So that 2 siomai samples are not suitable for consumption because the total plate count has exceeded the maximum limit on microbial contamination. Whereas 3 siomai samples have met the maximum limit on the total plate count that has been determined by (12), namely 1 x 10 5 colonies/g, so that the siomai are safe for consumption. From the results of the study (10) obtained 2 samples of siomai which were not meet the requirements while the microbiological test of the siomai product obtained 1 sample of siomai tested did not meet the Indonesia National Standard (SNI) 2897:2008 regarding the requirements for quality and food safety of fish siomai maximum limit of Total Plate Count, namely 5x104 colonies/g that the results obtained are not suitable for consumption

4. Conclusion

From the research results can be summarized that 12 samples contained the sample is particularly contaminated by *E. coli*, and there is no contamination of *Salmonella sp* found on siomai food. And one sample of siomai did not meet the bacterial contamination limit standard with a TPC value of 1.8 x 10^{7} colonies/gram and did not meet the specified maximum limit of bacterial contamination which was 5 x 10^{4} colonies / g in SNI 7756: 2013.

References

1 Undang Undang Republik Indonesia Nomor 18. https://luk.staff.ugm.ac.id/atur/UU18-2012Pangan.pdf; 2012.

2 Arlita Y. Identifikasi Bakteri Escherichia Coli Dan Salmonella Sp. Pada Makanan Jajanan Bakso Tusuk Di Kota Manado. J e-Biomedik [Internet]. 2014;2(1). Available from: https://doi.org/10.35790/ebm.2.1.2014.4387

3 Lestari MG. Ide Bisnis [Internet]. 2011. Available from: http://masayugita.blogspot.com/2011/11/ide-bisnis.html

4 Entang I. Microbiology and Parasitology for Nursing Academic and Schools of Health Workers Equal. Bandung: PT. Citra Aditya Bakti; 2003.

5 National Standardization Agency. Testing Methods for Microbial Contamination in Meat, Eggs and Milk, as well as Processed Results. 2008.

6 Arini LDD, Wulandari RM. Kontaminasi Bakteri Coliform pada Saus Siomai dari Pedagang Area Kampus di Surakarta. J Biomedika [Internet]. 2017;10(2):31–46. Available from: https://doi.org/10.31001/biomedika.v10i2.273

7 The Indonesian Ministry of Industry. Regulation of the Minister of Industry of the Republic of Indonesia concerning Guidelines for Good Manufacturing Practices. 2010;

8 National Standardization Agency. SNI-7756-2013. Fish Siomay. National Standardization Agency. 2013;

9 Yunus R, Mongan R, Rosnani. Cemaran Bakteri Gram Negatif pada Jajanan Siomay di Kota Kendari. Med Lab Technol J [Internet]. 2017;3(1). Available from: http://www.ejurnal-analiskesehatan.web.id/index.php/JAK/article/view/111

10 Romadhon Z. Identifikasi Bakteri Escherichia coli dan Salmonella sp. pada Siomay yang Dijual Di Kantin SD Negeri Di Kelurahan Pisangan, Cirendeu, dan Cempaka Putih. Fakultas Kedokteran dan Ilmu Kesehatan Universitas Islam Negeri Syarif Hidayatullah Jakarta; 2016.

11 National Standardization Agency. Tomato Sauce. 2004;

12 Drug and Food Control Agency. Regulation of the Head of BPOM of the Republic of Indonesia Number HK.03.1.23.04.12.2206 concerning Good Food Production Methods (CPPB) for Home Industries (IRT). Jakarta: Badan Pengawas Obat dan Makanan; 2012.